

B. Claims

The following is a complete listing of the claims, and replaces all earlier versions and listings.

1. (Currently Amended) A sensor device for detecting a reaction of a sensor material with a specimen based on an intensity of a surface plasmon polariton wave generated by light irradiation and propagated along a surface of a sensor medium, the sensor device comprising:

the sensor medium comprising a substrate, a metal film having a plurality of openings formed on the substrate, and the sensor material positioned on the metal film for reacting with the specimen, wherein the openings have a size smaller than a wavelength of the irradiation light and a predetermined pitch that is substantially equal to an integral multiple of a wavelength of the surface plasmon polariton wave, and

wherein the openings include adjacent two openings sandwiching a metal film portion having a circumferential effective length of circumference based on a thickness of the metal film, which is a substantially integral multiple of a wavelength of the surface plasmon polariton wave.

2. (Previously Presented) The sensor device according to Claim 1, wherein the sensor material is a biochemical sensor material.

3-4. (Cancelled)

5. (Previously Presented) The sensor device according to Claim 1, wherein the openings have a slit shape, and their periodic arrangement is a one-dimensional arrangement in a surface of the metal film.

6. (Cancelled)

7. (Previously Presented) The sensor device according to Claim 1, wherein the periodic structure is provided in a plurality of periodic structures, which have the same or different sizes and/or pitches of their openings and the same or different arrangement directions.

8. (Previously Presented) The sensor device according to Claim 1, wherein the periodic structure comprises at least one recess portion or projection portion provided in the metal film.

9. (Previously Presented) The sensor device according to Claim 8, wherein the openings and the at least one recess portion or the projection portion have a substantially circular shape or a substantially polygonal shape, and their periodic arrangements are two-dimensional.

10. (Previously Presented) The sensor device according to Claim 9, wherein the two-dimensional arrangement is such an arrangement that the recess portion or the projection portion is disposed concentrically around an opening.

11. (Previously Presented) The sensor device according to Claim 8, wherein the openings and the at least one recess portion or the projection portion have a slit shape, and their periodic arrangements are one-dimensional.

12. (Cancelled)

13. (Previously Presented) The sensor device according to Claim 1, wherein the metal film is a film of a metal or alloy selected from the group consisting of gold, silver, copper, and aluminum.

14-15. (Cancelled)

16. (Previously Presented) The sensor device according to Claim 1, wherein the substrate comprises a prism.

17. (Previously Presented) A sensor apparatus, comprising:
a sensor device according to any one of Claim 1;

a light source for irradiating the chemical sensor with light; and
a photodetector for detecting light transmitted through or reflected from the
chemical sensor.

18. (Previously Presented) The sensor apparatus according to Claim 17,
wherein the photodetector comprises a spectroscope.

19. (Previously Presented) The sensor apparatus according to Claim 18,
wherein the photodetector comprises means for detecting light transmitted through a
band-pass filter.

20. (Previously Presented) The sensor apparatus according to Claim 17,
wherein the sensor medium is integrally supported in a micro total analysis system
prepared through a semiconductor process.

21. (Previously Presented) The sensor apparatus according to Claim 17,
wherein the sensor medium is integrally supported in a DNA chip prepared by a
semiconductor process.

22. (Previously Presented) The sensor apparatus according to Claim 17, wherein the sensor medium is integrally supported in a protein chip prepared through a semiconductor process.